

THE DRY COLLODION PROCESS.

BY
CHARLES A. LONG.

THIRD EDITION.

PUBLISHED BY BLAND & LONG, OPTICIANS,
AND
PHOTOGRAPHIC INSTRUMENT MAKERS TO HER MAJESTY,



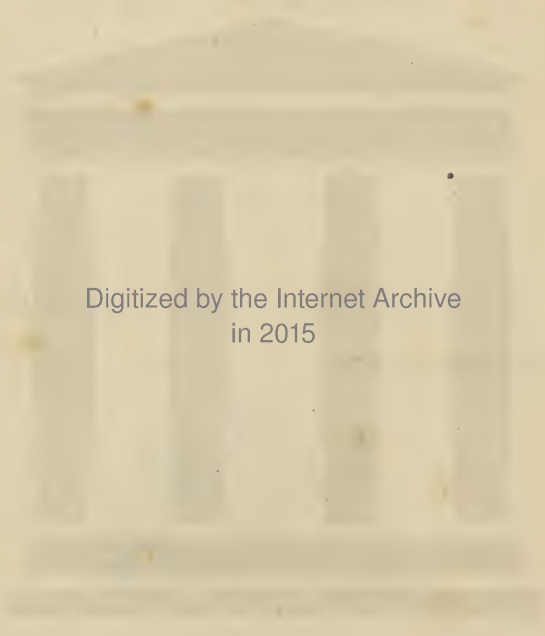
BY APPOINTMENT.

153, FLEET STREET, LONDON.

ENTERED AT STATIONERS' HALL.

Price 1s. Per Post 1s. 1d.

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H. SILVERLOCK, PRINTER,
WARDROBE TERRACE, DOCTORS' COMMONS, LONDON, E.C.

PREFACE TO FIRST EDITION.

THE following pages shall be devoted to the description of a process on Dry Collodion, which I believe to be at once simple and effective. The experiments connected with the perfection of this process have occupied my leisure time for the space of two years or more, and have been conducted with all the care of which I was master. The constant repetition of them enables me to say, that whoever will follow diligently the process step by step, as detailed in this Pamphlet, must succeed in producing pictures in every way such as could be required by the most exacting critic.

The process is simple, clean, and expeditious; and the resulting Negatives possess the exquisite softness of Albumen, the brilliancy of the wet Collodion, and the fine artistic texture of the Paper process.

To disarm criticism, and to make peace with my fellow labourers in the art, I wish it to be understood that I do not claim the use of Collodion, of Gelatine, of Metagelatine, or of any of the Chemicals used in the process—most of these have been employed by others in various ways; I merely reserve to myself the pleasure of placing in the hands of Photographers a definite and simple plan by which pictures may be taken on Dry Collodion.

CHARLES A. LONG.

June 20, 1857.

PREFACE TO SECOND EDITION.

IN issuing a second edition of the Dry Collodion process, I would take occasion to remark, that after some months' practical working, it has not been found necessary to make any material alteration in the process; success has usually attended the adoption of it, and in those cases where good pictures have not resulted, the failure has always been traced to the use of a Collodion not suited to the process.

I cannot allow this opportunity to pass, without thanking those gentlemen whose opinions possess weight in matters photographic, for the very candid manner in which they have tested the capabilities of my process, and for the very flattering testimony they have borne to its efficiency, simplicity, and certainty.

CHARLES A. LONG.

153, FLEET STREET,

September 24th, 1857.

PREFACE TO THIRD EDITION.

THE process described in the following pages has now been in use for twelve months, and I have much satisfaction in stating that it has, in almost every instance where it has been adopted and carried out with care and attention, yielded results which leave scarcely anything to be desired.

The present Edition might more properly be termed a reprint, as the alterations in the text do not extend to more than a few matters of detail, which experience has shewn to be desirable, the principles of the process remaining undisturbed.

CHARLES A. LONG.

153, FLEET STREET,

June 1st, 1858.

OPINIONS OF THE PRESS.

From the Athenæum.

We have not merely examined the description given by Mr. Long of his dry collodion process, but we have witnessed the results obtained by following carefully his directions. It appears to us that, by it, a collodion plate may be prepared at home, wrapped in paper, and packed in pormanteau; that we may journey to Rome or Venice, then place our plate in the camera obscura, and allow it for a few minutes to receive the luminous image; remove it in a dark room; re-pack it and trouble ourselves no more about it until our return to England; when, in the room in which it was prepared, we may witness the magic process of development, and rejoice that we have, without much labour, secured a picture of the Coliseum or of the Bridge of Sighs.

From the Journal of the Cambrian Archæological Association.

NEW PHOTOGRAPHIC PROCESS.—Mr. Long, of the firm of Bland and Long, Opticians, Fleet Street, has recently put forth a valuable pamphlet, in the form of an essay on the dry collodion process. By means of this, plates prepared weeks beforehand may be exposed to objects, and then kept for weeks afterwards before they are developed, as he has proved it himself on the Continent. The advantage of this process to travellers, and especially to archæologists, is immense; because hitherto the main drawback upon photography has been the trouble and expense of carrying chemicals, tents, &c. &c., besides the camera, with its lenses, to the scene of operation. Now, however, it will be sufficient to carry merely the camera, with a suitable supply of plates prepared according to this process. The observer can then, by merely exposing his plates, with the proper precautions, *bag* any number of views per diem, and on his return home can develop them—or have them developed—at leisure. If this process succeeds, it will have the effect of splitting photography into two distinct branches—the *æsthetic*, and the *practical*. The former will fall to the share of the intelligent observer, the traveller, the man of taste, who will go and search for objects, combine them, or use them, under the most favourable æsthetic circumstances, and then will carry them home to be handed over to the man of practice. Once in his hands, nothing will remain but to manipulate the plates according to the rules of photographic science, by means of all the best appliances that a well fitted laboratory can furnish. One branch will feed the other. One will be the department of observation, of search, of taste, of beauty; the other will be that of calm scientific development, of improvement, of preservation. One man will be like the artist who paints; the other like the artist who engraves. One will be like the author, the man who writes; the other like the printer, the man who perpetuates. We recommend members to enquire carefully about this new process; because if it becomes firmly established, any archæologist moving about the country may get views of churches, castles, cromlechs, meini-hirion, seals, &c. &c., usque ad satietatem—we had almost said *ad nauseam*; but *that* word can never be connected with archæology! The upshot of this is,—“Read Mr. Long’s pamphlet, and set up a portable camera with his prepared plates, as we intend doing ourselves!”

From the Liverpool and Manchester Photographic Journal.

We must advise all who are interested in dry processes to obtain Mr. Long’s clearly written pamphlet. (Leader, July 15th, 1857.)

Extract from Proceedings of Charlton Photographic Society, October 8th, 1857. Paper by Mr. Hooper,—On the results of his experience in the practice of several Preservative Processes.

I commenced experimenting on the process of Mr. Long. The success I have met with from the first has convinced me that that process will ere long be generally adopted: the plates being easily and quickly prepared, and keeping well, is a great advantage.

Extract from Letter from G. R. Smith, Esq., to the Editor of the London Photographic Journal, Sept 21, 1857.

My tour of a fortnight's duration having ended, I returned to London, and began developing (the dry plates). To my great delight, I found all Mr. Long had said in favour of his process fully realized. Picture after picture (I took twenty-eight) came out with great beauty, and so far as the process is concerned, I have not had a single failure.

Mr. Long's Dry Collodion Process.

Letter from Robert Hunt, Esq., F.R.S., to the Editor of the London Photographic Journal, October, 1857.

6, Green's Row, Chelsea.

Sir,—It is due to Mr. Long that I should state what my experience has been with his dry collodion plates, and I feel much satisfaction in doing so, being enabled fully to confirm all that Mr. Smith has said respecting the dry plates prepared as he has described (Photo. Journ. Sept. 21). On the 26th of August, Mr. Long, at my request, furnished me with some of his dry collodion plates. Absence from London, and the press of official engagements, prevented my trying any experiments with those plates until the 30th of September. Although the weather was very unfavourable, the result was superior to my expectations. On the 7th of October, at four in the afternoon, when the sky was covered with clouds and the weather stormy, I exposed a plate in the camera obscura for ten minutes to the dark brick building, Chelsea Hospital. I enclose you a positive print from the result of this experiment. When we remember that the sensitive plate had been kept by me for a period of *forty-two days*, and then exposed under very unfavourable circumstances, I think you will admit that the result is satisfactory. I should not content myself with this trial, but that I am again compelled to leave London for a long period, and I shall have no other opportunity of testing these plates for this year. I feel convinced that the traveller might with perfect safety use plates which have been prepared for a month, and thus relieve himself from much labour and frequent annoyance, by the use of Mr. Long's process.

ROBERT HUNT.

From the Illustrated London News, January 9, 1858.

It is but a few years since, when we heard with surprise, and some incredulity, that light could be made to delineate images of external objects upon chemically prepared tablets placed in the camera obscura,—now photography stares us in the face at every corner,—that which was wonderful has become familiar,—that which was mysterious is singularly common.

In cities, we see glass houses, on at least one roof in every street,—in villages, caravans, with Brown and Jones, photographers, are regularly found,—on the hills we discover the tent, and in the valleys the camera,—by the river-side there is the mysterious head hidden in the dark curtains of a dark box,—and upon the sea-shore the tripod-stand is securely fixed in the sands,

and a biped is evidently focusing for the next fine ocean wave,—the sketcher has fled to his own especial solitudes, and the photographer has usurped his place.

It has been said of the most recent photographic processes, as was well said of the octo-syllabic verse, that it possesses "unfortunate facilities." This is true in many respects of the positive collodion process, by which the myriads of sad reflections on humanity are perpetrated. Not so, however, is it with the negative process, by which alone we can multiply the beautiful things which the solar pencil traces with such fidelity. The labour attendant upon a photographic tour is great, and real enthusiasm alone carries the amateur forward. The camera obscura and the stand are a burden, and with the tent and chemical box, they become a real load. Then there is the uncertainty attendant upon the processes. We deal with the nicest chemical adjustments. The balance is arranged with caution for a certain set of conditions,—alter but one of these, and all goes wrong. We leave home in the morning, we work in the dark all day, and we return jaded at night, to find we have obtained—nothing.

Sensitive as the collodion process is, and charming as are the results, when all goes on successfully, it has not hitherto been a process which can be practised out of doors, without many extraordinary, expensive, and troublesome appliances.

It is, therefore, with very much satisfaction that we have watched the progress of the so-called "dry collodion processes." Nearly all the processes that have been published,—the "gelatine,"—the "oxymel,"—the "glycerine," and others,—have much that is excellent in them; but it appears to us that a dry collodion process devised by Mr. Long, of which he has recently published a description, is more simple and effective than any other. We have seen beautiful pictures obtained in Belgium upon plates prepared in England, and which plates were brought to this country again before the pictures were developed.

Any man may, previously to starting on his journey, prepare, or purchase prepared, a stock of glass plates. Armed with these and his camera, he may proceed to

"Where the bleak Swiss their stormy mansion tread,
And force a churlish soil for scanty bread ;"

or to that

"———sea Cybele fresh from ocean
Rising with her tiara of proud towers,"—

and, resting on his way, he may adjust his camera and his plate, and in the few minutes which, under any circumstances, he would spend in observation, he secures a picture for future study,—a photograph to give him pleasure in the quiet of his home.

Mr. Long has published a little treatise, with which we head this article, and by following out the simple directions which he gives, all may succeed in obtaining the important desideratum,—a parcel of highly sensitive plates, which can be packed in paper and stowed away in a portmanteau, to be drawn out as occasion may require, to be returned again to the same package (without having any of the annoyances attendant upon a box of liquid chemicals), and a plate which can be kept with its dormant picture quite uninjured until the photographer, on his arrival home, at his perfect leisure, in his own operating room, can develop the photograph which he has obtained.

Such are the facilities offered by this improvement, that we may expect almost every traveller will avail himself of it, and thus secure for his own portfolio, and the portfolios of his friends, views of scenes hallowed by their historical association,—of ruins rendered sacred from the sacred memories which still wrap them in their shadows, as the mantling ivy clothes their crumbling walls.

THE DRY COLLODION PROCESS.

BEFORE describing in detail the manipulations of the process on Dry Collodion plates, it will be necessary to say a few words on the materials and apparatus to be employed, and also to give an account of the means of preparing the various solutions used in the process. First,

THE COLLODION.

This being the principal material we have to use, we must exercise great care in the selection of a sample that possesses all the characteristics which fit it for a dry process. We must reject all samples that possess great tenacity and contractile power: the Collodion must not be too thick, and it must flow evenly over the plate, and not set in ridges. The best condition for the Iodized Collodion is that known as *powdery*, that is, being spread on the plate and partially dry, it cannot be removed as a film, but crumbles up on being pressed by the finger in its passage across the plate; in fact, such a condition as

would arise from using gun cotton prepared with acids at a high temperature.

The following formula will be found to answer most admirably :

Gun Cotton	60 grains.
Absolute Alcohol	5 ounces.
Sulphuric Æther, sp. gr. .730	15 ounces.

The cotton is to be shaken up with the mixture of alcohol and æther, and when dissolved, the bottle containing it must be stood aside, in order that any undissolved particles of cotton may subside. The clear liquid may then be decanted into a clean bottle for use.

It will be as well to test the quality of the Collodion thus prepared before coating any number of plates with it, for, although the above proportions are very excellent, some little latitude must be allowed for the different degrees of solubility of the various samples of cotton used from time to time. The film, when spread on the glass plate and partially dry, should not be capable of being removed in the form of a skin, but should give before the finger and crumble up on its being rubbed across the plate.

Should any difficulty, however, occur, it would be better to obtain a sample of the Collodion made by an experienced hand, in order that a fair trial may be given to the process. If the Collodion be too contractile it will give rise to blisters in the film, and will wash off the plate during development.

The IODIZING Solution that I have found to give the best results in this process is made in the manner following:—

Absolute Alcohol . . .	8 ounces.
Iodide of Cadmium . . .	64 grains.
Iodide of Ammonium . . .	64 grains.

The iodides are to be dissolved by agitation in the alcohol, and the resulting solution is to be carefully filtered, and preserved in a well stoppered bottle.

The IODIZED COLLODION consists of—

Iodizing Solution . . .	2 drams	} 1 ounce
Plain Collodion . . .	6 drams	

The Collodion should always be iodized at least twelve hours before it is required; this interval allows any insoluble matters either from the iodizing solution or from the Collodion itself to fall to the bottom, and enables the operator to pour off the clear solution into a perfectly clean bottle for use.

Next in importance to the Iodized Collodion comes

THE PRESERVATIVE SOLUTION.

Some care is required in the preparation of this solution, in order that it may be clear and bright when finished, and not contain particles that would be deposited in its passage over the Collodion film when being used. The chief precaution to be observed is *not to allow it to boil too rapidly, and not to conduct the operation over too fierce a fire*; attention

to this will prevent many failures, and ensure a solution in every way suited for the process.

Take one ounce of the best transparent gelatine, and throw it into a pipkin in which has been previously placed one pint of distilled water; set this on a slow fire, or over a lamp, until the gelatine is completely melted; then weigh out half ounce of pure citric acid and dissolve it in two ounces of distilled water; add this to the solution of gelatine, stirring it during the addition with a glass rod. The solution in the pipkin is now to be gently boiled for about half an hour: remove it from the fire, and add sufficient distilled water to make up the bulk of liquid to one pint. When quite cold, the liquid in the pipkin is to be filtered through two thicknesses of pure white blotting paper into a bottle perfectly dry and clean. We now add to every pint of filtered preservative solution, two ounces of alcohol of the specific gravity of .840.

The solution thus prepared is ready for use, and should be of a pale amber colour, without any signs of insoluble particles floating in it; should any appear after it has been prepared for some days, a second filtration will remove them, and render the liquid again bright and clear.

It will be found better to prepare this solution only in the quantity indicated above, unless the consumption be large, for, although it will keep good for a month or more, my experience points to the fact, that the

most successful results follow the use of Preservative Solution freshly prepared.

THE NITRATE OF SILVER BATH.

The bath for rendering the plates sensitive does not differ from that recommended for taking negatives with wet Collodion. The formula for its preparation may not be out of place, however, and may assist those whose knowledge of the matter is not perfect.

Nitrate of Silver (fused)	.	.	1 $\frac{1}{4}$ ounces.
Distilled Water	.	.	1 pint.
Iodide of Cadmium	.	.	3 grains.

Dissolve the nitrate of silver in half the water and then add the iodide of cadmium; thoroughly agitate the mixture for five or ten minutes, then add $\frac{1}{2}$ ounce of alcohol, sp. gr. .840, and fill up with the remaining half of the distilled water; further agitation, and subsequent filtration through two thicknesses of white bibulous paper, will put us in possession of a negative bath. The nitrate of silver being fused, and consequently, pure and neutral, and as it is essential to obtain clean pictures that the bath should be slightly acid in its reaction, we find it necessary to add 5 or 6 minims or drops of PURE glacial acetic acid to a bath of 20 ounces, in order that the above condition may obtain.

THE DEVELOPING SOLUTION

Is very simple in its nature, being merely a saturated

solution of gallic acid in distilled water, to which has been added a small proportion of alcohol of sp. gr. .840.

The exact formula is as follows:—

Distilled Water	1 pint.
Alcohol sp. gr. .840.	1 ounce.
Gallic Acid	$\frac{1}{2}$ ounce.

The gallic acid will not be entirely dissolved, but that left at the bottom of the bottle will ensure the solution being saturated; it is better not to filter the developing solution until it is required for use, as it is preferable to allow it to stand over an excess of gallic acid, than for it to be withdrawn after a slight agitation with the crystals; it is a great error to suppose that we obtain a saturated solution of gallic acid by merely agitating the crystals with water for a few moments.

The developing solution prepared as above directed will keep good and in working order for some weeks, but when it becomes of a dark color, it would be safer to reject it and prepare a fresh quantity than to run the risk of a failure from an impure and imperfect developing agent.

NITRATE OF SILVER SOLUTION,

For adding to the gallic acid during development, is composed of

Fused Nitrate of Silver	30 grains.
Distilled Water	1 ounce.

THE FIXING SOLUTION

Consists of a solution of hyposulphite of soda in water, (filtered,) in the following proportion :—

Hyposulphite of Soda in crystals .	8 ounces.
Rain or Filtered Water . . .	1 pint.

The APPARATUS, &c. required in the Dry Collodion process is of the most simple kind, and consist of the following items :—

Glass plates.

Pneumatic plate holders.

Plate holder, for cleaning the plates.

Glass or porcelain dishes.

Glass or gutta percha dipping bath and dipper.

Silver hook, for lifting plates.

Levelling stand.

Measures, 1, 2, and 4 ounce.

Glass funnels.

Wash leather.

Some clean cloths and broad camel's hair brush.

Cotton wool.

Bibulous paper.

* The Chemicals are—

Nitrate of silver (fused.)

Glacial acetic acid.

Iodized Collodion (dry.)

Gelatine.

* The dry Collodion and the various solutions, ready for use, may be obtained of the Publishers.

Citric Acid.

Alcohol.

Sulphuric æther.

Gallic acid.

Hyposulphite of soda.

Iodide of cadmium.

Benzoin varnish.

In the above List we presume that the operator is in possession of a suitable camera and lens, and the usual adjuncts of camera tripod, &c. &c. These should all be of the best kind, otherwise it will be impossible to obtain good results.



THE MANIPULATION.

The process of obtaining a picture on Dry Collodion plates is in itself a most simple and easy matter, but there are one or two precautions that appear necessary to ensure success that cannot be lightly neglected. In the first place, it is absolutely certain, that if we want a clean and bright picture, we must have a plate perfectly free from all extraneous matters, such as soap, grease, &c. Various plans for cleaning the glass plate have been proposed, all more or less successful, but in most of them there is one great fault, namely, that of using a powder, as tripoli, rotten-stone, &c. to rub off the dirt with. Now we find that in

practice this will not answer, from the almost impossibility of getting rid of the floating particles of the powder when the plate is rendered slightly electrical by rubbing, and as each of these particles if it become enveloped in the Collodion film, would produce a spot on the finished picture, we find it necessary to search in another direction for a detergent for the glass plate to which this objection would not apply. One soon presents itself in the form of *old waste Collodion*—this spread on the glass plate and rubbed off again with cotton wool, makes the best and most perfect cleanser hitherto proposed, without any of the objections usually appended to other materials used for the same purpose.

The next precaution necessary to be observed is, that all the solutions should be perfectly bright and clear; they should be absolutely free from floating particles of any kind. This is essential, as it is impossible to obtain clean pictures without attention to it; the floating bodies in the solution settle on the plate, and form so many nuclei, around which, in the development of the picture, the silver is deposited in an opaque mass, forming spots and blemishes on the surface of the plate.

There is one precaution that cannot be dispensed with, and that is, to be sure that the chemicals employed are of absolute purity; without this, success is very problematical, and vexation and disgust the sure reward of its neglect.

The process may for convenience be divided into the following stages:—

- 1.—Cleaning the plate.
- 2.—Coating it with Collodion.
- 3.—Rendering the plate sensitive.
- 4.—Applying the Preservative solution.
- 5.—Exposure in the camera.
- 6.—Development of the picture.
- 7.—Fixing the developed image.
- 8.—Varnishing the finished negative.

CLEANING THE PLATE.

The glass plate is first to be thoroughly washed with an abundance of water, and dried on clean cloths; it is then to be placed in the plate holder (*Fig. 1*), and have poured over its upper side a

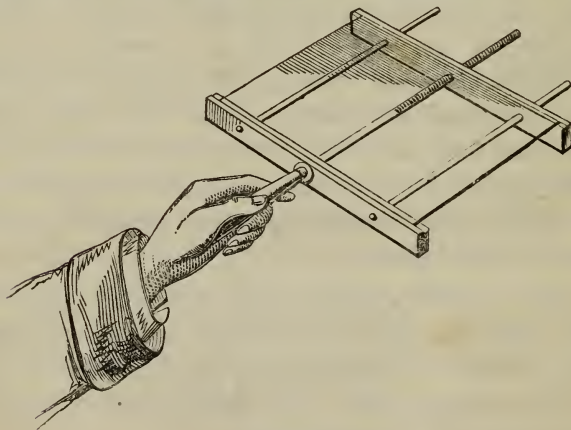


Fig. 1.

small quantity of old Collodion. Now take a tuft of cotton wool and rub the Collodion all over the plate, giving the hand a circular motion at the time: keep rubbing until the Collodion is very nearly dry, then turn the plate in the holder and repeat the same treatment with the opposite side; then lean the plate thus treated against a wall, while another, or any number are put through this stage. When a sufficient number have been so far cleaned, the plate holder is to be carefully wiped, and the first plate—the edges of which have also been carefully wiped with a *clean* cloth—is to be replaced, and treated with a smart rubbing with a wash leather, the operator at intervals gently breathing on the plate. Both sides of the plate being cleaned in this way, it may be removed, after again wiping the edges carefully, to the plate box, to await the subsequent steps of the process. Plates cleaned in this manner should look perfectly transparent, and free from any marks of the cloth or leather, and when breathed upon should condense the moisture of the breath in one uniform degree over the whole surface. If patches of uneven condensation appear, a repetition of the process must be had recourse to.

The plate being clean, we proceed to the next step,

COATING THE PLATE.

Lay a piece of clean blotting paper on the table, larger than the plate we are about to use; place the

clean plate on this, and then bring the pneumatic plate holder to bear on the centre of the glass, making sure that it has laid hold firmly. We then raise the plate with the left hand, and bring the surface upwards which was previously on the blotting paper; it will no doubt be found that small particles of dust have attached themselves to the plate, these must be removed by a broad and soft camel's hair brush, kept for this purpose only.

The Collodion is then to be poured on, as shown in the diagram (*Fig. 2*), and the superfluous quantity

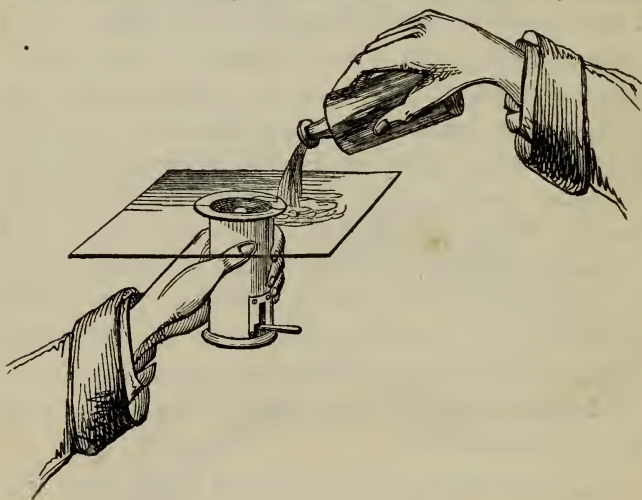


Fig. 2.

returned to the bottle from one of the corners of the plate. It does not matter which of the corners is used for this purpose, that which is most convenient

to the operator assuming the preference. If the Collodion should have a tendency to set in ridges across the plate, a rocking motion, while the delivery corner is in the mouth of the bottle, may be given to it, still keeping the plate in a vertical plane. This will restore the film to perfect evenness and freedom from irregularity of any sort. The plate should be held in the vertical position for a few moments before being placed on the dipper to undergo the next operation of

RENDERING THE PLATE SENSITIVE.

The plate being placed, coated side outwards, on the dipper, is to be plunged without hesitation into the nitrate of silver bath (*Fig. 3*). This must be

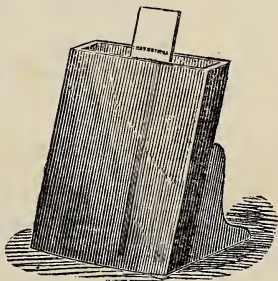


Fig. 3.

done without stopping, otherwise a line across the plate will indicate, on development, the position of the plate in the bath at the time this stoppage took place; so that if we were to immerse the plate by a

series of jerks, we should have as a result, so many bands of unequal development in the finished picture; showing the importance of plunging the plate into the bath without any stoppage during its descent.

When the plate has rested for half a minute in the bath, it may be withdrawn, and quickly re-immersed. This washing must be continued at intervals, until the greasy appearance goes off, generally for the space of two minutes, when the plate is to be taken out of the bath and placed with its lower edge on a pad of blotting paper, in a position as shown in the cut (*Fig. 4.*) A fragment of

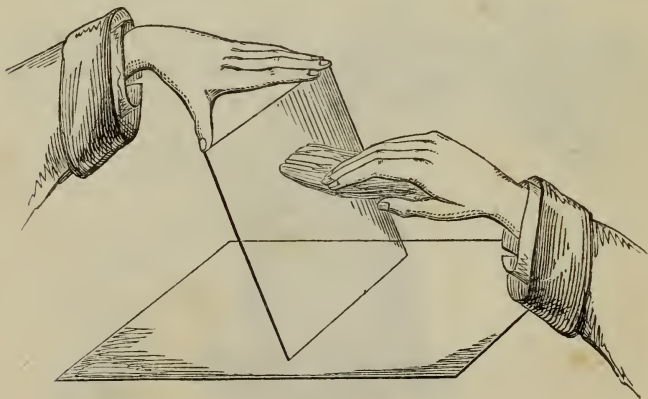


Fig. 4.

blotting paper is then to be used to absorb the moisture from the back of the plate, and a pneumatic plate holder—which should only be used for this purpose—is applied to it to form a support while

APPLYING THE PRESERVATIVE SOLUTION.

Taking the plate in the left hand by means of the pneumatic holder, incline it as shown in the diagram (*Fig. 5*); then having poured into a perfectly clean

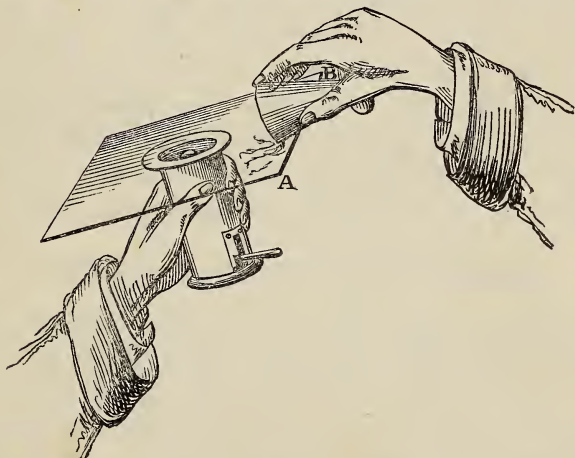


Fig. 5.

measure rather more of the preservative solution than is necessary to cover the plate twice,* pour half of it along the upper edge (A B) in such a manner, that a wave of the solution may flow uniformly from one end of the plate to the other; allow this to flow off into the waste pan or sink, and then bring the plate to the horizontal position, and pour on the remainder of the preservative solution, eight times at least, allowing

* A plate, 9 inches by 7, takes about 1 ounce of solution.

it to flow back into the measure from each corner in succession, in order that the whole plate may be brought uniformly under its influence. The plate is to be again placed on a piece of clean blotting paper (as shown at *Fig. 4*), and its back once more wiped with a fragment of blotting or papier Joseph, in order to remove any of the preservative solution that may have run from the surface to the underside in the previous operation. The plate thus preserved is to be reared on a piece of blotting paper with its face against the wall until dry, and is then to be stowed away in a plate box, perfectly light-tight to await the

EXPOSURE IN THE CAMERA.

Collodion plates preserved as above directed, will keep perfectly good and sensitive for 12 months at least; and from the appearance of the developed image on a plate that has been kept that time, I see at present no reason why, if preserved from the damp, they would not keep indefinitely. In my experiments, I have never found the least difference in sensitiveness, whether the plate be used within a few hours of the time of its preparation, or has been kept for months; until, however, we have had more experience in the matter, it would be safer not to rely on plates more than 12 months old.

The time of exposure in the camera, of course varies in this process, under the same circumstances as it does with the wet Collodion; but I have found as a general

rule, that it is better to give the plate a full exposure than to fall into the opposite extreme: that is to say, it is preferable to expose the plate sufficient time for the deepest shadows to make an impression than to close the dark slide at an earlier period, the mode of development allowing considerable latitude in this particular. With a 3-inch single lens, 16-inch focus, with a $\frac{1}{2}$ -inch stop, the usual time for a bright landscape will be about 5 minutes; this of course is merely an approximation to the time of exposure, the exact time can only be arrived at by experience. I do not think I can do better than follow the plan adopted in my "Practical Photography," of giving instances of under and over exposure, as a means of educating the tyro in the appearances that result from these conditions of the plate.

If the exposure has been of too short duration, the image will come out under the developing solution with difficulty; and after a continued immersion in it will only present the high lights, the deep shadows not being represented, or, if so, in so faint a manner as to be useless in the picture.

An over exposed plate, when treated with the developing solution, will almost immediately give indications of the picture; and in a few minutes, the whole of the picture, *deep shadows and all*, will come out in unnatural force; on looking through the picture thus produced, we shall observe a great flatness in it, there is a want of contrast between the

various parts, and although by continuing the development we might obtain a tolerably intense negative, the resulting picture would be flat, meagre, and unsatisfactory: on the contrary, a plate that has been exposed for the correct time, will comport itself very differently under development from the foregoing.

The sky and high lights will first appear, then the half tones, and lastly, the parts of the picture that were in deep shadow will show themselves; this effect should take place in about five minutes from the time of immersion in the developing bath: a picture that comes out sooner than this, is, as a general rule, over exposed; and one that is much after the five minutes before it makes its appearance, may be considered as under exposed.

We trust that the above instances may be of service in indicating the average time required for an exposure of the plate, but we must ask the reader not to take the figures given as actual values, but merely as very close approximations to the truth. We will imagine the plate to have been properly exposed, and proceed to

THE DEVELOPMENT OF THE PICTURE.

It is not necessary that the picture should be developed immediately after exposure in the camera; any time that is convenient to the operator may intervene between the processes, provided the aggre-

gate time before and after exposure does not exceed the limits of keeping power of the plate.

The development of the picture may be conducted in two ways, either by immersing the plate in baths or dishes, or by placing it on the levelling stand and treating it with the solutions, in their proper order, as detailed below. Each plan possesses certain advantages, but it is of little consequence which one is followed. Perhaps there is less danger of the film washing off if the plate be treated on the levelling stand, and on the other side with large plates it is more difficult to cover them evenly with the developing solution than it is simply to immerse them in a pan of solution. We say to the reader, try both ways, and make your own selection.

The plate upon being removed from the camera is placed face upwards in a porcelain or glass dish of a convenient size (not too large), and sufficient distilled water is to be poured over it to cover the surface thoroughly—this is for the purpose of softening the preservative solution, and must be allowed to remain on the plate for five minutes; the plate is then to be lifted in and out of the water by means of the silver hook. This done, remove the plate to a perfectly clean dish, and pour carefully over it the developing solution, composed of

Saturated Solution of Gallic Acid (p. 10)	8 ounces.
Solution of Nitrate of Silver (p. 10)	. 2 drams.

THOROUGHLY MIXED.

In a few minutes the picture will begin to make its appearance, and will gradually unfold its details under the influence of the developer, until the whole of them are apparent; on raising the plate, however, when this stage of development is reached, and viewing it by transmitted light, the picture will appear weak and poor; we must now remove the plate from the bath, and add 2 drams more of the nitrate silver solution, and having thoroughly mixed it with the gallic acid already in the dish, we return the partially developed plate, which in the course of a few minutes will have acquired a great amount of intensity, —the exact degree can be regulated by the time of immersion: when the picture appears sufficiently intense, it is to be removed from the developing dish, and a gentle stream of water is poured over it, in order to remove any adhering developing solution, and stop all further reducing action on it.

During the whole time of the development, the gallic acid should remain quite clear; it will become slightly discoloured before the end of the development, but it ought not at any time to become muddy, or it will deposit a sort of sandy sediment on the surface of the plate, which cannot be removed by subsequent washing.

The usual time occupied in the development of a successful picture is from 20 to 30 minutes, it might be developed much quicker by using pyrogallic acid, but at present I give the preference to the

developer I have described, as I believe it to be more certain, and more under the control of the operator than the pyrogallic acid; and further, as it is not necessary to watch the development all the time it is going on, there can be very little saving of time in the more rapid method of bringing out the latent picture.

The picture being washed free from the adhering developing solution, is to be placed on the levelling stand, and subjected to the seventh part of the process—

FIXING THE DEVELOPED IMAGE.

This is accomplished by pouring over the surface of the plate sufficient solution of hyposulphite of soda (p. 15) to thoroughly cover it, this will dissolve out the unaltered iodide of silver, and give us a clear and bright picture, in which the deep shadows should be as transparent as the glass itself, and the high lights as dense as a piece of metal, the intermediate tones assuming their proper positions according to the intensity of the light that was concerned in their formation.

When the whole of the yellow iodide of silver is removed, the fixing solution may be thrown off, and the plate must be treated with an abundance of water; too much cannot well be given at this stage, as the hyposulphite adheres with great tenacity to the plate,

even after a good washing. The back of the plate must be washed as well as the front, for I have found that a neglect of this precaution has ruined many a fine negative; the hyposulphite remaining at the back finding its way by capillary attraction to the surface, and once there, its destructive qualities are sure, sooner or later, to render themselves evident.

The picture being thoroughly washed, and either dried spontaneously or by the fire, has only to be covered with a film of varnish. And now comes the last operation, of

VARNISHING THE FINISHED NEGATIVE.

Benzoin varnish is the best coating that can be given to a Collodion negative. It resists the action of pieces of grit; it does not crack; and, above all, it does not, like amber varnish, split off the picture on the slightest friction.

The application of this varnish is a very simple matter. The negative is to be again placed on a pneumatic plate holder, and the varnish is to be poured on to the surface in precisely the same manner as the Collodion was at the commencement of the process, the superfluous quantity being returned to the bottle: in a few moments the varnish will be quite dry and hard, and the plate may be handled with perfect safety

I may mention, as a precaution, in varnishing the plate, that it is better to perform that operation in a still atmosphere; as the solvent of the gum being chloroform and very volatile, if it were conducted in a current of air, there might be some difficulty in obtaining an even coating to the picture.

In concluding this description of a process, which is at once simple and certain, I would ask the patient attention of those who may do me the honor of repeating my experiments. I have endeavoured to render the details of the process as intelligible as possible, and if I have succeeded in advancing the art of Photography only one step by so doing, I consider that it is an ample return for hours and days spent in anxious thought and laborious experiment.

FINIS.

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	<i>s.</i>	<i>d.</i>	
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Glacial Acetic Acid	1	0	"
Pure Gelatine	0	6	"
Pure Citric Acid	0	6	"
Gallic Acid, pure	1	6	"
Iodide of Cadmium	3	0	"
Hyposulphite of Soda	1	0	per lb.
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5	×	4		6	6	8 $\frac{1}{2}$	×	6 $\frac{1}{2}$		0	18	0
5 $\frac{1}{2}$	×	3 $\frac{1}{2}$		6	0	9	×	7		1	1	0
6 $\frac{1}{4}$	×	3 $\frac{1}{2}$		8	6	10	×	8		1	6	0
6 $\frac{1}{2}$	×	4 $\frac{1}{4}$		8	6	11	×	9		1	13	6
6 $\frac{3}{4}$	×	3 $\frac{3}{4}$		8	9	12	×	10		2	0	0
6	×	5		8	6	15	×	12		4	0	0

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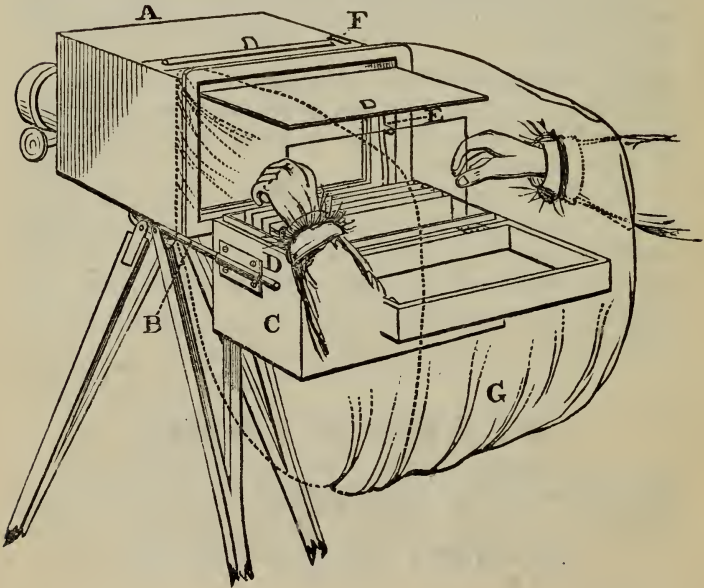
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DESCRIPTION AND DIRECTIONS FOR USE.

No matter what process we employ to retain the sensitiveness of our plates, it is most objectionable that the glasses should be made to slide by their gravity from the plate-box to the slide; for if we employ either honey, glycerine, or oxymel as preservative agents, the chances are considerably in favor of an amount of dust settling on the surface, the dust being in a great part formed by the attrition of the roughened edges of the plate against the plate-box. Another inconvenience attending the use of a box when the plate has to slide, is the danger that exists under that arrangement of ripping the film from the edges of the plate by the friction against the groove in the box which holds it. These may appear very trivial matters, but they are nevertheless great drawbacks to successful operations.

We may mention that the plan we are about to describe is equally applicable to all Cameras of moderate size. We will, however, take our description from the form of apparatus adapted to a double lens Stereoscopic Camera.

The Camera (A) is furnished at its back with two wires (B). On these wires slides the plate-box (C), which has previously been fitted at its sides with two sockets (D). Just inside the back of the Camera box is a spring (E), and on the top of the Camera is a button (F), which secures the dark slide in its place.

We now slide the box of prepared plates (C) on to the wires (B), the lid of the box opening from the Camera; we

then stretch over the whole affair, the black light proof covering (G); this completes the arrangement, and now for the mode of operating.

The opaque covering is furnished at its side with two elastic rings. Into these thrust the hands, so that the rings may firmly encompass the wrist. Then open the plate-box, and throw the lid quite back. Next unbutton the door of the dark slide, and raise it until the spring (E) flies underneath it, and retains it in a horizontal position. This we will presume to be done with the right hand; the left hand being engaged as soon as the door is opened, in holding the plate that is already in the back in its place. The right hand being now at liberty, comes to the assistance of the left, and the plate that has undergone exposure is safely transferred to the vacant groove in the plate-box. This accomplished, the next plate is to be placed in the back, and the same operations gone through in the inverse order, the left holding the plate in its place, while the right releases the door from the influence of the spring (E), and re-buttons it, leaving the plate quite safe in the dark slide.

When we require to focus for a fresh picture, it is only necessary to remove the dark covering from that part of the Camera where the ground glass is placed. The picture can be seen without removing the plate-box or the whole of the covering.

It is obvious that there is no limit to the number of glasses that can be taken to the field of operations. In this way, several boxes holding a dozen each, can be strapped together and placed on the Camera, one by one, as occasion or opportunity may direct.

11 x 9 at 1 " 13 " 6

for 2.

$$\begin{array}{r} 6 \\ \hline 10 \text{ " } 1 \text{ " } 0 \end{array}$$

6 x 5 at 2/6

$$\begin{array}{r} 6 \\ \hline 2 \text{ " } 11 \text{ " } 0 \end{array}$$

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